IMPACT OF CLIMATE CHANGE ON OZONE INDUCED MORTALITY IN EUROPE

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Background and Aims: Ozone is a highly oxidative pollutant, associated with respiratory morbidity and mortality. All else (e.g. ozone precursors) being equal, ground-level ozone will increase as temperatures increase with climate change. As a part of the Climate-TRAP project we used CO_2 emission scenarios, models and epidemiological data to assess ozone-related health impacts under a changing climate.
Methods: European ozone concentrations were modelled at a grid size of 50x50 km using MATCH-RCA_3. Projections from two climate models, $ECHAM_4$ and HADLEY, were used, assuming greenhouse gas emission scenarios A2 and A1B, respectively. With $ECHAM_4$ (A2) two periods were compared: the baseline period as 1961–1990 and future as 2021–2050. With HADLEY (A1B) two additional periods were included: the current situation as 1990–2009 and further future as 2041–2060. The impact on mortality (short-term effect) was calculated for exposures above a daily maximum 8-hour concentrations of 70 μgm^{-3}. We used a European-wide exposure-response function with country-specific baseline mortality.
Results: Comparing the current situation with the baseline period (HADLEY (A1B)), the largest increase in ozone-associated mortality due to climate change (~4%) occurred in Belgium, Ireland, Netherlands and UK. Comparing the baseline period and the future, the increase is projected to be biggest in Belgium, France, Spain and Portugal (10–14%) and the effect will be stronger for the A2 scenario (using $ECHAM_4$). However, in Nordic and Baltic countries the scenarios suggest a decrease in ozone-related mortality of the same magnitude. Furthermore, there were regional differences in climate change projections, depending which of the climate models ($ECHAM_4$ or HADLEY) were implemented. Also interactions between temperature and air pollution may need to be included.
Conclusions: The current study suggests that projected effects of climate change on ozone levels could differentially influence mortality and morbidity across Europe.